

**Constraints on Late Pleistocene Uplift Rates Along the Active Serra Fault
and Timing of the Onset of Transpressional Deformation Along
the San Andreas Fault, Northern San Francisco Peninsula**

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Principal Investigators:

S. John Caskey, Department of Geosciences, San Francisco State University, San Francisco, CA 94132; phone: 415-405-0353; fax: 415-338-7705; e-mail: caskey@sfsu.edu

Karen Grove, Department of Geosciences, San Francisco State University, San Francisco, CA 94132; phone: 415-338-2617; fax: 415-338-7705; e-mail: kgrove@sfsu.edu

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INVESTIGATIONS UNDERTAKEN

During the grant period from November 24, 2003 through November 23, 2004, we have focused on studies of the sedimentology of the Colma Formation where it is exposed at Thornton Beach and Ocean Beach in Daly City and southwest San Francisco. We have also collected 9 samples of the Colma and uppermost Merced formations at key stratigraphic positions for OSL dating. These samples are currently being analyzed by Dr. Glenn Berger at the Desert Research Institute (DRI). The results of these investigations will have bearing on late Pleistocene uplift rates along the Serra fault in Daly City and southwest San Francisco and the timing of onset of transpressional deformation along the San Andreas fault on the northern San Francisco peninsula.

RESULTS

Our study focuses on coastal exposures of the late Pleistocene Colma and uppermost Merced Formations located at Ocean Beach and Thornton Beach. The uppermost sequences of the Merced Formation at Ocean Beach, designated "sequences X and Y" by Clifton and Hunter (1999), are included in our study because an angular unconformity between the two sequences appears to record the onset of uplift along the Serra fault in this area (Kennedy, 2002). Between Ocean and Thornton beaches, exposures of the Colma and Merced formations rise in elevation from north to south from 20 to 70 meters. Deposits of the Colma Formation unconformably overly the Merced Formation and are gently, east-tilted locally, whereas the Merced Formation is locally steeply-east-tilted and folded, particularly above the inferred trace of the blind, west-dipping Serra thrust fault. Our investigations indicate that the Colma Formation consists of marine sediments deposited in environments ranging from the nearshore to backshore. The

marine depositional environment of these sediments is significant because it will allow for relatively straightforward estimations of uplift rates once the ages of the units are known. Nine samples have been collected for OSL analyses from the Colma and uppermost Merced formations. These samples have been prepared and analyzed in the lab, and are presently undergoing final analyses and interpretations (G. Berger, DRI, person. comm., 2005). Kennedy (2002) previously documented compelling evidence for mid-to-late Holocene tilting above the inferred trace of the blind Serra fault, so the data will provide important new information regarding fault slip rate and uplift history on the only known active fault within the city of San Francisco.

REFERENCES CITED

- Clifton, H.E., and Hunter, R.E., 1999, Depositional and other features of the Merced Formation in sea cliff exposures south of San Francisco, California: *in* Wagner, D.L., and Graham, S.A., eds, Geologic field trips in Northern California: California Division of Mines and Geology Special Publication 119, p. 89-100.
- Kennedy, D.G., Neotectonic Character of the Serra Fault, Northern San Francisco Peninsula, California, M.S. Thesis, San Francisco State University, 121 pp., 2002.

NON-TECHNICAL SUMMARY

Our research is focused on determining the depositional environments and ages of uplifted sediments exposed along the seacliffs between Ocean and Thornton beaches in southwest San Francisco and Daly City. These sediments have been uplifted in this area apparently along the Serra thrust fault, which is the only known "active" fault within the city of San Francisco. We have determined that the sediments were mostly deposited in a marine beach environment. The ages of the deposits are presently being determined by laboratory OSL dating techniques. The new information will enable us to determine the history and rate of uplift along a concealed (i.e., "blind") trace of the Serra fault.

REPORTS PUBLISHED

No reports have yet been published on this funded research.